DOCUMENT RESUME

ED 026 705 EA 001 574

By-Wilbur, Thomas P.

Relationship between Certain Staff Characteristics and Measures of Holding Power and Expenditure.

Columbia Univ., New York, N.Y. Inst. of Administrative Research.
Pub Date Feb 68
Note-7p.
Journal Cit-IAR-Research Bulletin; v8 n2 Feb 1968
EDRS Price MF-$0.25 HC-$0.45
Descriptors-*Elementary Schools, *Expenditure Per Student, *High Schools, *School Holding Power, Statistical Analysis, *Teacher Characteristics

This study examines the relationship of 40 factors of elementary (K-6) and high school (10-12) staffs to measures of school system holding power and to net current expenditure per pupil. The staff data were collected in 1962 from a sample of 68 districts, and the holding power data were collected later from the same districts. The data are treated statistically in three steps: (1) The percentage of staff falling in each index of every factor is determined for both sets of data (K-6 and 10-12), (2) the percentage falling in each index is correlated with holding power and expenditure, and (3) the indices are combined, so that every possible combination is added and correlated with holding power and expenditure. Five factors show a significant and logical relationship: origin of staff, travel, literary interest, college training, and professional interest. The factors age, distance lived from work, intent to remain in present position, sex, marital status, number of school age children, children in parental family, residence while a college student, and level of father's education show a significant relationship but have no logical theoretical explanation. The results generally parallel those of similar studies. (HW)

Relationship Between Certain Staff Characteristics and Measures of Holding Power and Expenditure

Thomas P. Wilbur

Viewing the school's professional teaching force as an entity, researchers in the Institute of Administrative Research have, over the past quarter century, conducted numerous studies relating staff characteristics to quantitative measures of school system inputs, processes and outputs in order to determine which characteristics of the school's staff are important to an excellent school program. This article presents an extension of these studies.

In 1965, after a review of the professional personnel research conducted in the Institute of Administrative Research, Bernard H. McKenna[1] concluded that four "personal" and three "professional" characteristics of professional staffs had shown consistently significant relationships with other school system variables, chiefly adaptability[2], and were, therefore, important in effecting school system excellence. "Personal" characteristics which had yielded significant correlations in these studies were "geographic origin of staff," "domestic travel," "foreign travel" and "literary interest." "Professional" staff characteristics showing consistently high relationships were "amount of college training," "breadth of training" and "professional interest."

The present study explores the relationship between 40 factors[3] of elementary (grades K-6) and high school (grades 10-12) staffs and measures of school system holding power (a measure of the school district's ability to hold pupils until graduation, this is essentially the computed reciprocal of the district's drop-out rate). The relation of staff factors to financial support (net current expenditure per pupil) is also examined. The staff data were collected from a sample of 68 districts by Philip A. Wood in 1962. The holding power data were later collected on the same districts by Norman Walsh.*

The statistical treatment of the data involved three basic steps. First, the percent of staff falling in each index of every factor was determined for both sets of data (elementary and high school). Second, the percentage falling in each index was correlated with holding power and expenditure. Third, the indices were combined, so that their every possible combination were added and correlated with holding power and expenditure. For example, indices of the age factor were such that the percentage of staff falling in every five year age interval from *under 25* to *60-65* was combined with every other interval in each district. Thus age, with nine indices, yielded 510 simple correlations in both samples and with both variables. This procedure was followed for every combination of two or more indices of every factor (except those having to do with number of books read, purchased, or owned; for these factors only single index correlations were made).

The 40 staff factors so analyzed have been placed into four groups depending upon the size, consistency and logic of their correlations with the holding power measure. The relationship with expenditure level is also noted as an indication of the effects school fiscal policy may have upon staff characteristics.

Results of the Study

The first of these four categories contains those factors which show a significant and logical[4] relationship

[1] Bernard H. McKenna, *Staffing the Schools*, New York: Bureau of Publications, Teachers College, Columbia University, 1965.

[2] "Adaptability," used as a criterion of school excellence in early Institute studies, measured the capacity of a school system to take on newer and more appropriate educational practices.

[3] A staff *characteristic* is a generic term for a quality of the professional staff, such as *training;* a staff factor is a measure of a characteristic, such as *academic degree held;* a staff index is a specific measure of a factor such as *M.A. degree.*

* "Holding Power as a Criterion of School Quality," Vol. 6, No. 1, Nov. 1965, and "More on the Holding Power Criterion," Vol. 7, No. 1, Nov. 1966.

[4] Usual tests of significance are not appropriate to these studies because of the great number of influential staff factors and because the data are not normally distributed. In past studies correlations of .20 and over have been considered significant and this study has accepted that definition. A correlation is considered significant and logical, therefore, if it is above .20 and does not contradict logical findings of previous studies. A factor analysis of the inter-relationship between staff factors and a multivariate analysis of them in relation to holding power is planned. This study should provide a stronger base for deciding on the importance of the relationships between staff factors and other variables of school systems, such as holding power scores.

with holding power. As might be expected, this category contains factors of characteristics identified by McKenna. The second category contains factors which show a significant relationship with holding power, but for which there is no logical theoretical explanation. The third category includes several factors which might, on the basis of past studies, be expected to relate with holding power, but have shown only weak or conflicting correlations. The final category lists those factors for which no consistent relationship was found to exist with holding power. Relationships between expenditure level and staff characteristics are also noted where relevant.

Staff Factors Which Show Logical, Significant Relationships

The staff factors included in this section corroborate McKenna's conclusions (with the exception of "breadth of training") and are, therefore, grouped according to his classification scheme.

1. *Origin of Staff.* To get at the question of geographic origin, teachers in the sample were asked where they lived immediately before employment by their district. The relationship between the percent of teachers living *within the district* and holding power was strongly negative ($r = -.38$ in the K-6 sample; $r = -.56$ in the 10-12 sample). The combined percentage of teachers living *outside the district, but within the state* and *out of state,* on the other hand, was strongly positive ($r = .39$ in the K-6 sample; $r = .55$ in the 10-12 sample). The correlations with expenditure level were slightly weaker than these, but were in the same direction. These relationships support the thesis that the excellent school district draws its teaching staff from a wide geographic area.

2. *Travel.* This staff characteristic was measured by three factors in the present study: *destination of the teacher's longest trip* (U.S.A. or outside the U.S.A.), *length of longest trip,* and *recency of longest trip.* The percentage of staff responding *within U.S.A.* as the destination of their longest trip showed a significantly negative relationship with holding power ($r = -.25$ in the K-6 sample; $r = -.34$ in the 10-12 sample). The relationship between holding power and percent of staff listing *outside the U.S.A.* as the destination of their longest trip, conversely, showed a strong positive relationship ($r = .33$ in the K-6 sample; $r = .45$ in the 10-12 sample). The correlations with expenditure level ran in the same direction and were slightly higher.

The one-way distance of the staff's longest trip also yields a strong relationship with holding power. The *shortest* possible trip listed in the questionnaire (500 to 1199 miles), for example, showed a strong negative relationship with holding power ($r = -.57$ in the K-6 sample; $r = -.34$ in the 10-12 sample). Conversely, the relationship between the percentage of staff checking the *longest* possible trip (5000+ miles) and holding power was strongly positive ($r = .46$ in the K-6 sample; $r = .39$ in the 10-12 sample). There were nine indices to this factor and, in general, high positive correlations with holding power resulted from combinations of indices for trips of long distance. The highest positive correlation in the elementary sample, for instance, was made with a percentage combination of trips of *1200-1499, 1500-1999, 3000-3499, 4000-4999 and 5000+ miles* ($r = .68$) and the highest positive correlation in the high school sample was made with a percentage combination of trips of *3000-3499, 3500-3999, 4000-4999* and *5000+ miles* ($r = .49$). The correlations with expenditure level were slightly smaller in the elementary sample and slightly larger in the high school sample.

As to *recency of longest trip,* the highest single-index correlations with holding power were obtained for *1960,* two years before the data were collected ($r = .37$ in the elementary sample; $r = .26$ in the high school sample). Stronger relationships were obtained by combining years. A combination of the years *1956, 1958, 1960* and *1962,* for example, showed the highest correlation in the elementary sample ($r = .40$) and the years *1957, 1958, 1960* and *1962* combined showed the highest correlation in the high school sample ($r = .35$).

Examination of these factors, then, supports the contention that the excellent school district attracts many teachers who have traveled widely. In addition, it would appear that teachers in these districts travel more frequently.

3. *Literary Interest.* This characteristic of teaching staffs was measured by six factors in the present study. The factors, their highest correlation with holding power and the index of that correlation are: *number of novels read in the past year* ($r = .28$, *16 novels,* K-6 sample; $r = .29$, *3 novels,* 10-12 sample); *number of general, non-fiction books read in the past year* ($r = .30$, *2 books,* K-6 sample; $r = .39$, *4 books,* 10-12 sample); *number of novels purchased in the past year* ($r = .21$, *2 novels,* K-6 sample; $r = .29$, *3 novels,* 10-12 sample); *number of general, non-fiction books purchased in the past year* ($r = .20$, *2 books,* K-6 sample; $r = .21$, *5 books,* 10-12 sample); *estimated number of novels in personal library*

(not significant in elementary sample; r = .23, *260-999 books,* 10-12 sample); *estimated number of general, non-fiction books in personal library* (r = .25, *30-39 books,* K-6 sample; r = .36 *100-109* books, 10-12 sample). The relationships between these factors and expenditure level are similar but stronger than with holding power. These correlations, while not extremely high, are consistent and support the contention that teachers in good school districts display a strong literary interest.

4. *College Training.* The relationship between the amount of college training of school staffs and other school system variables has been consistently strong in Institute studies. It is not surprising, therefore, that the factors *length of training* and *academic degree working toward* yielded significant correlations in this study. The index *4½ years of college training or less,* for example, showed a negative relationship (r = —.18, K-6 sample; r = —.41, 10-12 sample) and, conversely, the index *5½ years of college training* yielded a high positive relationship (r = .20, K-6 sample; r = .29, 10-12 sample). The highest correlation for the *length of training* factor is obtained when indices for the percent of staff with 5½, 6 and 6½ years of training are combined in the 10-12 sample (r = .44). An even stronger relationship is evident between indices of the *length of training* factor and expenditure level.

A second measure of training was obtained by asking teachers toward what degree they were working at the time they filled out the questionnaire. The only significant negative relationship occurred in the 10-12 sample with the index *percent of staff working toward the bachelor's degree* (r = —.20). Obviously, a district whose staff is drawn partially from the small group of teachers still working toward the lowest degree is not highly selective in its personnel practices. The highest positive single-index correlations, on the other hand, were obtained with *percent of staff working toward the doctorate* (r = .26, K-6 sample; r = .32, 10-12 sample). High positive correlations were also obtained by combining the percent of staff working toward master's and doctor's degrees (r = .30, K-6 sample; r = .21, 10-12 sample). The relationship between these indices and expenditure level was similar.

Recency of college training also showed a relationship with holding power. The percent of staff listing *1960* (only two years before the data was collected) as the year of their last course, for example, showed a positive correlation with holding power (r = .25, K-6 sample; r = .27, 10-12 sample). In the secondary sample, the percent of staff listing *before 1955* as the date of their last course related negatively with holding power (r = —.24).

These correlations affirm the thesis that excellent school districts attract academically advanced teachers. In addition, it would appear that they attract teachers with recent college preparation.

5. *Professional Interest.* This characteristic of the professional staff was measured by five factors in the present study. The first three measure the number of professional books read, purchased and owned by teachers in the samples. The relationship between the first factor, *number of professional books read in the past year,* is insignificant at the elementary level; however, it is significant in the 10-12 sample (r = .23, *2 professional books read in the past year).* The factor *number of professional books purchased in the past year* yielded similar results (insignificant in the K-6 sample; r = .26, *3 books* in the 10-12 sample). The *number of professional books owned* shows a significant relationship in both groups (r = .23, 30-39 books owned, K-6 sample; r = .44, 40-49 books owned, 10-12 sample). The relationship between these three factors and expenditure level is similar but slightly stronger.

The factor *number of committees served on in the past three years* also shows significant relationships with holding power, especially at the elementary level. In the K-6 sample, the highest single-index correlation occurs with *percent of staff serving on six or more committees* (r = .24) and when this index is combined with those for *one, three* and *four committees* the relationship grows stronger (r = .32). The highest relationship at the secondary level is obtained with a combination of indices for *one, two, three* and *six committees.* There are, interestingly, no significant relationships between indices of this factor and expenditure level.

The *number of articles published outside the school system* can also be considered a measure of professional interest, and the highest single index correlation of this factor with holding power is found with *four or more articles published* (r = .27, K-6 sample; r = .23, 10-12 sample). Combinations of indices yield stronger relationships. A combination of indices for *one, two* and *four articles published,* for example, yields a strong correlation (r = .33, K-6 sample; r = .27, 10-12 sample). The relationship between indices of this factor and expenditure level is similar, although generally slightly smaller.

Considering these five factors as measures of the school staff's "professional interest," then, the thesis that

the excellent staff is active in professional matters has been strengthened.

Other Significant Factors

The staff factors included in this category showed significant relationships with holding power in the samples used. Several of them reveal a certain amount of logic in that their highest correlations are obtained when many indices are combined. This would indicate that for such factors as *age of staff,* in the secondary sample, and *distance lived from work,* a staffing balance is of some importance. It would be difficult, however, to employ these factors in any personnel policy, and they are, therefore, listed separately. Most of the correlations in this group, while of a significant level, are lower than the majority of those in the preceding section.

1. *Age.* In the high school sample it is clear that the highest positive correlations with both holding power and expenditure are obtained when all indices except the highest two, ages *55-59* and *60 and over,* are combined ($r = .27$). These two indices, on the other hand, combine to reveal a strong negative relationship in the secondary sample ($r = -.29$). We might infer from this that the staff of an excellent high school has a balanced age distribution, but is not overly staffed with persons near retirement.

2. *Distance Lived from Work.* Teachers in the samples were asked how far away from their school they lived and the resulting factor showed a relationship similar to the secondary age factor. That is, the highest correlations were obtained by combining a number of indices so that a wide range of distances from work was represented. In the elementary sample, for example, the highest correlation with holding power was obtained by combining indices for *1, 2, 3, 5, 6-10, 11-15, 16-20* and *21-70 miles* ($r = .29$). In the high school sample the highest correlation was obtained by combining indices for *3, 4, 11-15, 16-20* and *21-70* miles. Similar relationships were obtained with expenditure level.

3. *Intent to Remain in Present Position.* We might expect that in the excellent school system teachers would be satisfied with their positions. The present study does not support that thesis, however, especially at the elementary level. The percent of teachers replying "yes" to the question, *do you intend to remain in your present position?* was significantly negative ($r = -.27$ in the K-6 sample; $r = -.20$ in the 10-12 sample). The percent of teachers replying "no," on the other hand, was positively related in the elementary sample ($r = .22$). Probably what this shows is that elementary teachers in the sample who taught in excellent systems had ambitions for advancement. The relationships between this factor and expenditure level were similar and stronger in the elementary sample and insignificant in the secondary sample.

4. *Sex.* At the elementary level, the percent of teachers of either sex was insignificant in this study. At the high school level, however, there was a strongly positive relationship between the percent of *male* teachers and holding power ($r = .41$) and a strongly negative relationship between the percent of *female* teachers and holding power ($r = -.37$). The relationship between this factor and expenditure was not as great, although it was significant and in the same direction.

5. *Marital Status.* At the high school level the percentage of *single, married, widowed, divorced* or *separated* staff members related only barely significantly with holding power. The percentage of staff that were *single, married* or *divorced,* for example, showed a positive relationship ($r = .21$) and the combined percentage that were *widowed* or *separated* showed a negative one ($r = -.20$). Higher correlations were obtained in the elementary sample. The percentage of teachers who were either *single* or *married* showed a significantly positive relationship with holding power ($r = .29$) and the percentage who were *widowed, divorced* or *separated* showed a strong negative relationship ($r = -.35$).

6. *Number of School Age Children.* The number of *school age children* of staffs provides some interesting correlations. At both the elementary and high school levels, for example, there was a significant negative relationship between the percentage of staff with *one child* and holding power ($r = -.33$, K-6 sample; $r = -.24$, 10-12 sample). When the indices for *zero, two, three, four* and *five or more children* were combined the correlations were strongly positive ($r = .35$, K-6 sample; $r = .31$, 10-12 sample). The relationship between these indices and expenditure level was nearly identical.

7. *Children in Parental Family.* The factor *number of children in the teacher's parental family* also showed several odd relationships. The single index *two children,* for example, had a strong positive relation in both samples ($r = .36$, K-6 sample; $r = .29$, 10-12 sample). Several of the higher numbers of children, on the other hand, related negatively. *Nine or more children,* for example, was strongly negative in the elementary sample ($r = -.44$) and *eight children* showed a similar relationship in the secondary sample ($r = -.46$). It is

probable that this factor measures some sort of socio-economic characteristic as the percentage of teachers coming from normal-sized families appeared to relate positively with holding power.

8. *Residence While a College Student.* The residence of staff members while college students, both undergraduate and graduate, showed intriguing relationships with holding power. For both questions there were three responses. Staff members could live at *home, school* or *other.* The undergraduate residence factor showed a positive relationship between the number of staff living at *home* and holding power ($r = .24$, K-6 sample; $r = .21$, 10-12 sample). The percent of staff living at *school,* on the other hand, showed a negative relationship with holding power ($r = -.24$, K-6 sample; $r = -.27$, 10-12 sample).

The *graduate school residence* factor contained several very strong correlations. The relationship between percent of staff living at *home* was strongly positive ($r = .40$, K-6 sample; $r = .43$, 10-12 sample). When percentage indices for living at *home* and *school* in the secondary sample were combined, the relationship was even stronger ($r = .52$). In the elementary sample it was weaker ($r = .24$). The relationship between these indices and expenditure level is similar and usually somewhat stronger. Here again, the suggestion is strong that the factor is a socio-economic one.

9. *Level of Father's Education.* The highest positive single index correlation in this factor was between percent of staff whose *father attended graduate school* ($r = .36$, K-6 sample; $r = .19$, 10-12 sample). The highest negative relationship with holding power, conversely, was with percent of staff whose *father had attended only elementary school* ($r = -.21$, K-6 sample; $r = -.20$, 10-12 sample). Again, the evidence is strong that this is a socio-economic variable.

Factors Which Show Unexpected Relationships

Several of the staff factors that Wood and his colleagues hypothesized would relate to other school system variables either did not in the present study, or their indices yielded correlations that tended to cancel each other out. We might expect, for example, that the factors *year of last in-service course* or *number of disciplines in which the staff took an undergraduate course* might relate to holding power, but they did not. It is also instructive that the two factors *membership in professional organizations* and *offices held in both professional organizations and non-professional organizations* did not correlate significantly with the variables employed in this study. This is counter to the findings of other studies.

Other factors which showed no relationship with holding power are *percent of staff with parents who are teachers, number of below-school-age children of staff members, the percent of self-support while in college, the educational level of teacher's mothers* and *the nature of the staff member's longest trip.*

Conclusion

Writing in 1946, Mort and Vincent stated that, "The teacher in the adaptable school is . . . a richly living person . . . well-traveled . . . broadly informed . . . has a degree of professional preparation . . . is capable in creative fields . . . in constantly looking for the improvement of his teaching procedures."[5] It would appear from the staff factors here considered that these characteristics are still evident in staff members of excellent school systems—if we will define excellent school systems as those with the ability to graduate a large percentage of their pupils and with high expenditure levels.

[5] Paul R. Mort and William S. Vincent, *A Look at Our Schools,* New York: Cattell and Co., 1946, p. 96.

Research Bulletin

Devoted to research carried on by the Institute of Administrative Research and related groups, review of results, report of work in progress, discussion of theory and design, and implications for educational policies
Published in November, February and May
by the Institute of Administrative Research

Subscription rate: $1.50 per year

February, 1968

In this Issue